independent form. Applicants cancel claims 6, 29, 33, and 34, without prejudice. Applicants submit claims 35-44 for consideration by the Examiner. Applicants believe that no new matter has been introduced in this response.

Cliams 10, 15, 16, 19, and 27 are objected to by the Examiner. Applicants have amended claims as necessary to remove the objections. Applicant assert that no amendment to claim 16 is required. Applicants respectfully request withdrawal of the rejection.

Claim 24 is rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Applicants have amended claim 24 to more clearly recite the subject-matter of the claim, and respectfully request withdrawal of the rejection.

Claims 1-6 are rejected under 35 U.S.C. § 102(e) as being anticipated by *Tran et al.* The Examiner asserts that *Tran et al.* discloses the subject matter of the invention as recited by Applicants in claims 1-6. Applicants respectfully respond to the rejection.

Tran et al. discloses a process for removing and dissolving metal particles from a substrate surface in a solution containing hydrogen peroxide. The process includes a platen speed having a greater speed than a carrier speed and a retaining ring pressure of 4 psi and an inner tube pressure of 2 psi for a carrier head holding a substrate.

Tran et al. does not teach or suggest polishing the substrate at a ratio of carrier head rotational speed to platen rotational speed of between about 2:1 and about 12:1. The ratio of carrier head rotational speed to platen rotational speed of between about 2:1 and about 12:1 is disclose in paragraph **[0060]** of the specification for reduced film defects, reduced residual material, and reduced delamination of films from the substrate surface during polishing.

Tran et al. does not teach, show, or suggest positioning a substrate having a conductive material formed thereon in a polishing apparatus having one or more rotational carrier heads and one or more rotatable platens, wherein the carrier head comprises a retaining ring and a membrane for securing a substrate in the carrier head and the platen has a polishing article disposed thereon, contacting the substrate surface with the polishing article at a ratio of retaining ring contact pressure to membrane

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pressure of greater than about 1.1:1, and polishing the substrate to remove conductive material from the substrate, wherein polishing the substrate comprises polishing the substrate at a ratio of carrier head rotational speed to platen rotational speed of between about 2:1 and about 12:1, as recited in claim 1 and claims dependent thereon. Applicants respectfully request withdrawal of the rejection.

Claims 1-4 and 6 are rejected under 35 U.S.C. § 102(e) as being anticipated by *Kollodge et al.* The Examiner asserts that *Kollodge et al.* discloses the subject matter of the invention as recited by Applicants in claims 1-4 and 6. Applicants respectfully respond to the rejection.

Kollodge et al. discloses a process for chemically modifying a semiconductor wafer with an article including a plurality of three-dimensional unit cell repeating across the surface of the article. The process includes a platen speed having a greater speed than a carrier speed and a retaining ring pressure of 3.5 psi and an inner tube and membrane pressure of 3.0 psi for a carrier head holding a substrate.

Kollodge et al. does not teach, show, or suggest positioning a substrate having a conductive material formed thereon in a polishing apparatus having one or more rotational carrier heads and one or more rotatable platens, wherein the carrier head comprises a retaining ring and a membrane for securing a substrate in the carrier head and the platen has a polishing article disposed thereon, contacting the substrate surface with the polishing article at a ratio of retaining ring contact pressure to membrane pressure of greater than about 1.1:1, and polishing the substrate to remove conductive material from the substrate, wherein polishing the substrate comprises polishing the substrate at a ratio of carrier head rotational speed to platen rotational speed of between about 2:1 and about 12:1, as recited in claim 1 and claims dependent thereon. Applicants respectfully request withdrawal of the rejection.

Claims 1-7 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Messner et al.* The Examiner asserts that it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the polishing method taught by *Messner et al.* to remove portions of deposited metal layers from a wafer surface. Applicants respectfully respond to the rejection.

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Messner et al. discloses fixed abrasive articles and abrasive constructions containing at least one fluorochemical agent. *Messner et al.* also discloses that CMP is tailored for removal of particular material from a semiconductor surface using a particular solution that optimizes removal. (*See,* Col. 1, lines 59-66). The process includes a platen speed of 31 rpm, a carrier speed of 33 rpm, a retaining ring pressure of 11 psi and a contact pressure 6 psi.

Messner et al. does not teach, show, or suggest positioning a substrate having a conductive material formed thereon in a polishing apparatus having one or more rotational carrier heads and one or more rotatable platens, wherein the carrier head comprises a retaining ring and a membrane for securing a substrate in the carrier head and the platen has a polishing article disposed thereon, contacting the substrate surface with the polishing article at a ratio of retaining ring contact pressure to membrane pressure of greater than about 1.1:1, and polishing the substrate to remove conductive material from the substrate, wherein polishing the substrate comprises polishing the substrate at a ratio of carrier head rotational speed to platen rotational speed of between about 2:1 and about 12:1, as recited in claim 1 and claims dependent thereon. Applicants respectfully request withdrawal of the rejection.

Claims 12-14 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Tran et al.* as applied to claim 1 above, and further in view of *Somekh* (US 5,897,426 from applicant's IDS). The Examiner asserts that it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the polishing method taught by *Tran et al.* with the teaching of *Somekh*. Applicants respectfully respond to the rejection.

Tran et al. is described above. Claims 12-14 depend on amended claim 1, which claim 1 is previously distinguished over *Tran et al.* *Somekh* discloses planarization of a substrate surface with one or more fixed abrasive polishing pad with a subsequent polishing with a soft pad to remove defects from polishing with fixed abrasive polishing pads.

Thus, the combination of *Tran et al.* and *Somekh* does not teach, show, or suggest positioning a substrate having a conductive material formed thereon in a polishing apparatus having one or more rotational carrier heads and one or more

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rotatable platens, wherein the carrier head comprises a retaining ring and a membrane for securing a substrate in the carrier head and the platen has a polishing article disposed thereon, contacting the substrate surface with the polishing article at a ratio of retaining ring contact pressure to membrane pressure of greater than about 1.1:1, and polishing the substrate to remove conductive material from the substrate, wherein polishing the substrate comprises polishing the substrate at a ratio of carrier head rotational speed to platen rotational speed of between about 2:1 and about 12:1, as recited in claim 1 and claims dependent thereon. Applicants respectfully request withdrawal of the rejection.

Claims 29-32 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Kim et al.* (US 6,113,465, from applicant's IDS) in view of *Messner et al.* The Examiner asserts that it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the polishing method taught by *Kim et al.* with the teaching of *Messner et al.* Applicants respectfully respond to the rejection.

Messner et al. is described above. *Kim et al.* discloses planarization of a substrate surface with an initial low down force and high polishing speed followed by a high down force and low polishing speed to facilitate removal of a thin film layer and to optimize global uniformity of the entire wafer surface.

Claim 29 has been cancelled and claims 30-32 have been amended to depend from claim 11, which depends from claim 9. Claim 9 was not rejected on the prior art and has been converted into an independent claim.

The combination of *Messner et al.* and *Kim et al.* does not teach, show, or suggest positioning a substrate having a conductive material formed thereon in a polishing apparatus having one or more rotational carrier heads and one or more rotatable platens, wherein the carrier head comprises a retaining ring and a membrane for securing a substrate in the carrier head and the platen has a polishing article disposed thereon, contacting the substrate surface with the polishing article at a ratio of retaining ring contact pressure to membrane pressure of greater than about 1.1:1, and polishing the substrate to remove conductive material from the substrate, wherein polishing the substrate comprises polishing the substrate at a first polishing pressure and a first platen rotational speed and then polishing the substrate at a second polishing

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pressure less than the first polishing pressure and a second platen rotational speed less than the first platen rotational speed, as recited in claim 9, and claims dependent thereon. Applicants respectfully request withdrawal of the rejection.

The prior art made of record is noted. However, it is believed that the secondary references are no more pertinent to the Applicants' disclosure than the primary references cited in the office action. Therefore, it is believed that a detailed discussion of the secondary references is not deemed necessary for a full and complete response to this office action. Accordingly, allowance of the claims is respectfully requested.

In conclusion, the references cited by the Examiner, neither alone nor in combination, teach, show, or suggest the methods of the present invention as recited herein. Having addressed all issues set out in the office action, Applicants respectfully submit that the claims are in condition for allowance and respectfully request that the claims be allowed.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION

Please replace the title, with the following title:

METHODS AND APPARATUS FOR POLISHING SUBSTRATES COMPRISING CONDUCTIVE AND DIELECTRIC MATERIALS WITH REDUCED TOPOGRAPHICAL DEFECTS

Please replace paragraph **[0030]**, with the following paragraph **[0030]**:

[0030] The planarizing process and composition that can used to polish a substrate disposed in chemical mechanical polishing process equipment, such as the [Mirra®] MIRRA® polishing system, the [Mirra® Mesa™] MIRRA® MESA™ polishing system, and the [Reflexion™] REFLEXION™ polishing system, all of which are available from Applied Materials, Inc., The [Mirra®] MIRRA® polishing system is further described in U.S. Patent No. 5,738,574, entitled, "Continuous Processing System for Chemical Mechanical Polishing," the entirety of which is incorporated herein by reference to the extent not inconsistent with the invention.

Please replace paragraph **[0031]**, with the following paragraph **[0031]**:

[0031] Although, the processes and compositions described herein are illustrated utilizing a three platen system, such as the [Mirra®] MIRRA® polishing system, any system enabling chemical mechanical polishing using the composition or processes described herein can be used to advantage. Examples of other suitable apparatus include orbital polishing systems, such as the Obsidian 8200C System available from Applied Materials, Inc., or a linear polishing system, using a sliding or circulating polishing belt or similar device. An example of a linear polishing system is more fully described in co-pending U.S. Patent Application Serial No. 09/244,456, filed on February 4, 1999, now U.S. Patent Serial No. 6,244,935, issued on June 12, 2001, and incorporated herein by reference to the extent not inconsistent with the invention.

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Please replace paragraph **[0038]**, with the following paragraph **[0038]**:

[0038] A [hard] soft polishing material is broadly described herein as a polishing material having a polishing surface of a hardness of less than about 50 on the Shore D Hardness scale for polymeric materials as described and measured by the American Society for Testing and Materials (ASTM), headquartered in Philadelphia, Pennsylvania. The soft polishing pad may be composed of a napped poromeric synthetic material, such as a uniformly compressible material including a polymeric material, *i.e.*, plastic, and/or foam, felt, rubber, or a combination thereof. An example of a soft polishing material is polyurethane impregnated with felt. An example of a soft polishing pad is the Politex or Suba series, *i.e.*, Suba IV, of polishing pads available from Rodel, Inc. (Politex and Suba are tradenames of Rodel Inc.).

Please replace paragraph **[0041]**, with the following paragraph **[0041]**:

[0041] A rotatable linear platen may be used for the second polishing station 125b. An example of a linear polishing system, and an example of a polishing system having a rotatable polishing pad and a rotatable linear platen, is more fully described in co-pending U.S. Patent Application Serial No. 09/244,456, filed on February 4, 1999, now U.S. Patent Serial No. 6,244,935, issued on June 12, 2001, and incorporated herein by reference to the extent not inconsistent with the invention. Alternatively, a stationary platen or a rotatable or linear platen having a stationary article may be used for the first, second, or third, polishing stations 125a, 125b, and 125c.

Please replace paragraph **[0047]**, with the following paragraph **[0047]**:

[0047] Figure 3 depicts a sectional view of the carrier head 180. The carrier head 180 generally includes a carrier plate 202, a cover 204, and a retaining ring 206. The carrier plate 202, which in one embodiment may comprise an inflatable bladder or membrane, generally presses the substrate 110 against the polishing and plating stations [106, 102]

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100a, 100b, and 100c. The retaining ring 206 generally circumscribes the carrier plate 202 and prevents the substrate 110 from moving laterally out from under the carrier head 180 during processing. The retaining ring 206 may includes one or more grooves 222 disposed in a lower surface 224 of the retaining ring 206 as shown in Figure 4. The grooves 222 generally have a radial orientation. In one embodiment, the ring 206 contains at least three grooves. However, it is believed that grooves in the retaining ring 206 has corners or edges which may damage low k dielectric films and contribute to frictional forces that increase film delamination; and that a grooveless retaining ring is used when polishing substrates with the processes described herein.

Please replace paragraph **[0048]**, with the following paragraph **[0048]**:

[0048] Returning to Figure 3, the carrier plate 202 and retaining ring 206 are generally movable relative to one another in an axial direction. A relative distance 214 between the carrier plate's bottom and the retaining ring 206 may be controlled thus setting the relative distance that the substrate 110 extends beyond the retaining ring 206, or the amount of pressure the retaining ring 206 exerts upon the polishing or processing table [106, 102] 100a, 100b, and 100c.

Please replace paragraph **[0049]**, with the following paragraph **[0049]**:

[0049] In the embodiment depicted in the enlargement of Figure 3, the retaining ring 206 is movably coupled to the carrier head 180 by a flexure 208. The flexure 208, which may be a flexible metal sheet or polymer, is disposed between the retaining ring 206 and the carrier plate 202 to allow axial movement therebetween. A piston 210 disposed in the cover 204 is coupled to the retaining ring 206. Fluid is supplied to (or removed from) the piston 210 and urges the retaining ring 206 in the axial direction, thereby defining the distance 214. Examples of other embodiments of polishing heads 130 that have a retaining ring and a carrier plate positional relative to each other are described in United States Patent No. 6,024,630, issued February 25, 2000 to *Shendon, et al.*; United States Patent Application No. 08/861,260, filed May 21, 1997 by *Zuniga*, now

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U.S. Patent Serial No. 6,183,354, issued on February 6, 2001; and United States Patent Application No. 09/258,042, filed February 25, 1999 by *Somer, et al.*, now U.S. Patent Serial No. 6,276,998, issued on August 21, 2001, all of which are hereby incorporated by reference in their entireties.

Please replace paragraph **[0060]**, with the following paragraph **[0060]**:

[0060] In one aspect of the invention, reduced film defects, reduced residual material, and reduced delamination may be achieved by having a carrier head rotational speed greater than a platen rotational speed by a ratio of carrier head rotational speed to platen rotational speed of greater than about 1:1, such as a ratio of carrier head rotational speed to platen rotational speed between about 2:1 and about 12:1, to remove conductive material. A ratio of carrier head rotational speed to platen rotational speed of between about 10:1 and about 12:1 has been used to effectively remove conductive material with minimal or reduced film delamination.

Please replace paragraph **[0068]**, with the following paragraph **[0068]**:

[0068] The dielectric layer can comprise any of various dielectric materials known or unknown that may be employed in the manufacture of semiconductor devices. For example, dielectric materials, such as silicon dioxide, phosphorus-doped silicon glass (PSG), boron-phosphorus-doped silicon glass (BPSG), and carbon-doped silicon dioxide, can be employed. The dielectric layer may also include low dielectric constant (low k) materials, including fluoro-silicon glass (FSG), polymers, such as polymides, silicon carbide, such as [BLOk™] BLOK™ dielectric materials, available from Applied Materials, Inc. of Santa Clara, California, and carbon-containing silicon oxides, such as [Black Diamond™] BLACK DIAMOND™ dielectric materials, available from Applied Materials, Inc. of Santa Clara, California. The openings are formed in interlayer dielectrics by conventional photolithographic and etching techniques. The invention also contemplates the use of dielectric materials, known or unknown, that may be used as dielectric layers in semiconductor fabrication.

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Please replace paragraph **[0073]**, with the following paragraph **[0073]**:

[0073] A further description of a two-pressure polishing process is in U.S. Patent Application Serial No. 09/469,70[8]9, filed on [12/21/99] December 21, 1999, and U.S. Patent Application Serial No. 09/741,538, filed on [12/19/01] December 19, 2000, now published as 2001/0004538 on June 21, 2001, both of which are incorporated herein by reference to the extent not inconsistent with the disclosure or claimed aspects herein.

Please replace paragraph **[0096]**, with the following paragraph **[0096]**:

[0096] The substrate may then be transferred to the third polishing platen having the third polishing pad 100c for a buffing process at step 350. An example of a buffing process comprises positing the substrate on the third platen having a soft polishing pad, such as a Politex pad, delivering an cleaning composition, such as an [Electra Clean™] ELECTRA CLEAN™ composition available from Applied Materials, of Santa Clara California, to the polishing pad and polishing at 63 rpm and a contact pressure of about 2 psi for 20 seconds, washing the substrate surface with deionized water for 10 seconds, and applying a polishing slurry, such as an [Electrapolish™] ELECTRAPOLISH™ composition available from Applied Materials, of Santa Clara California, to the polishing pad and polishing at 63 rpm and a contact pressure of about 2 psi for 20 seconds.

Please replace paragraph **[0097]**, with the following paragraph **[0097]**:

[0097] Optionally, a cleaning solution may be applied to each of the polishing pads during or subsequent each of the polishing process to remove particulate matter and spent reagents from the polishing process as well as help minimize metal residue deposition on the polishing pads and defects formed on a substrate surface. An example of a suitable cleaning solution is [Electra Clean™] ELECTRA CLEAN™

composition commercially available from Applied Materials, Inc., of Santa Clara, California.

Please replace paragraph **[0102]**, with the following paragraph **[0102]**:

[0102] A series of substrates were polished according to the two-step polishing process described above in steps 300-350. A first experimental process was performed on a [Mirra™] MIRRA® three platen polishing system using Cabot EPC-5001 composition on a IC-1010 polishing pad on platen 1, an [Electrapolish™] ELECTRAPOLISH™ polishing composition from Applied Materials, Inc., of Santa Clara, California, on a IC-1010 on platen 2, and an [Electrapolish™] ELECTRAPOLISH™ polishing composition on a Politex pad on platen 3.

Please replace paragraph **[0103]**, with the following paragraph **[0103]**:

[0103] The substrates polished under the processing condition shown in Table 1 below comprise a substrate stack of silicon, a first [Black Diamond™] BLACK DIAMOND™ low k dielectric film, a [BLOk™] BLOK™ low k dielectric film, a second [Black Diamond™] BLACK DIAMOND™ low k dielectric film, a dielectric anti-reflective coating (DARC), which a feature definition was formed in the dielectric layers and filled using a tantalum nitride barrier layer, and then a copper fill of the feature definition. An example substrate may contain a silicon surface, 1 μm thick [Black Diamond™] BLACK DIAMOND™ dielectric layer, 500Å thick [BLOk™] BLOK™ dielectric barrier layer/etch stop, 5000Å thick [Black Diamond™] BLACK DIAMOND™ dielectric layer formed thereon. A feature definition was formed in the dielectric layers and filled with a 250 Å layer of tantalum nitride and 2000 Å of copper seed layer followed by 1 μm of electroplated copper. A series of substrates composed above was polished using the compositions and polishing pads described above by the processes parameters listed in Table 1 below:

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Table 1: Experimental Processing Parameters

Wafer #	P1(1st)	Prr/ Pm	Peeling/ RR	Peeling	P1(2nd)	P2	P3
W1 (Control)	3/93/3.4 for 40s	1.1	2	2	2/43/2.3	3/103/3.4	P3 Buffing
W2 (Control)	3/93/3.4 for 40s	1.1	2		2/43/2.3	3/103/3.4	P3 Buffing
W3	3/93/6 for 40s	2	1	1	2/43/4	3/103/6	P3 Buffing
W4	3/93/6 for 40s	2	1		2/43/4	3/103/6	P3 Buffing
W5	3/93/7.5 for 40s	2.5	0	0.5	2/43/5	3/103/7.5	P3 Buffing
W6	3/93/7.5 for 40s	2.5	1		2/43/5	3/103/7.5	P3 Buffing
W7	3/93/9 for 40s	3	0	0.5	2/43/6	3/103/9	P3 Buffing
W8	3/93/9 for 40s	3	1		2/43/6	3/103/9	P3 Buffing
W9	3/93/10.5 for 40s	3.5	1	1	2/43/7	3/103/10.5	P3 Buffing
W10	3/93/10.5 for 40s	3.5	1		2/43/7	3/103/10.5	P3 Buffing
W11(Control)	2/43/2.3 for 120s	1.1	2	2	2/43	3/103	P3 Buffing
W12(Control)	2/43/2.3 for 120s	1.1	2		2/43	3/103	P3 Buffing
W13	2/43/5 for 120s	2.5	0	0.5	2/43/5	3/103/7.5	P3 Buffing
W14	2/43/5 for 120s	2.5	1		2/43/5	3/103/7.5	P3 Buffing

Please replace paragraph **[0110]**, with the following paragraph **[0110]**:

[0110] The process parameters of Table [3] 2 are as follows. Split is the wafer number, RR is the retaining ring contact pressure in psi, Pl is the platen rotational speed in rpms, H is the carrier head rotational speed in rpms, and peeling is the degree of delamination with 0 being no observable peeling, 1 being almost no peeling, 2 being minor peeling of the substrate surface, an 3 being severe peeling of the film from the substrate surface. The substrates of Table [3] 2 were analyzed and it was observed that decreasing platen rotational speed results in reduced film delamination, increasing carrier head rotational speed resulting in reduced film delamination, and a greater carrier head rotational speed than platen rotational speed resulted in reduced film delamination.

Table 2: Rotational Speed Differential

Degree of peeling (0=no, 1=almost none, 2=minor, 3severe)											
	Removal Rate		1st stage		2nd stage		3rd stage		4th stage	
	Process	Rate (A/min)	Time	Peeling	Time	peeling	Time	peeling	Time	peeling
Split1	RR=3.4/Pl=120/H=10	4000	60	1	30	2	30	2.5	Stop	–
Split2	RR=3.4/Pl=10/H=120	1200	60	0	180	0	180	0	180	0
Split3	RR=6.8/pi=120/H=10	5700	60	0.5	30	0.5	30	0.5	Stop	–
Split4	RR=6.8/Pl=10/H=120	1100	60	0.5	180	0.5	180	1	180	1

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IN THE CLAIMS:

1. (Amended) A method for processing a substrate, comprising:

positioning a substrate having a conductive material formed thereon in a polishing apparatus having one or more rotational carrier heads and one or more rotatable platens, wherein the carrier head comprises a retaining ring and a membrane for securing a substrate in the carrier head and the platen has a polishing article disposed thereon;

contacting the substrate surface with the polishing article at a ratio of retaining ring contact pressure to membrane pressure of greater than about 1.1:1; and

polishing the substrate to remove conductive material from the substrate, <u>wherein polishing the substrate comprises polishing the substrate at a ratio of carrier head rotational speed to platen rotational speed of between about 2:1 and about 12:1</u>.

7. (Amended) The method of claim [6] <u>1</u>, wherein the platen rotational speed and a carrier head rotational speed provide a [second] relative linear velocity between about 20 mm/second and about 1675 mm/second at the center of the substrate.

8. (Amended) [The method of claim 7] <u>A method for processing a substrate, comprising:</u>

<u>positioning a substrate having a conductive material formed thereon in a polishing apparatus having one or more rotational carrier heads and one or more rotatable platens, wherein the carrier head comprises a retaining ring and a membrane for securing a substrate in the carrier head and the platen has a polishing article disposed thereon;</u>

<u>contacting the substrate surface with the polishing article at a ratio of retaining ring contact pressure to membrane pressure of greater than about 1.1:1; and</u>

<u>polishing the substrate to remove conductive material from the substrate at a ratio of carrier head rotational speed to platen rotational speed of between about 1:1 and about 12:1 and a relative linear velocity between about 20 mm/second and about 1675 mm/second at the center of the substrate,</u> wherein the carrier head has a carrier head rotational speed between about 10 rpm and about 120 rpms, the platen has a

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platen rotational speed between about 10 rpm and about 40 rpms, and the platen rotational speed and the carrier head rotational speed are accelerated at a rate between about 5 rpms/second and about 30 rpms/second.

9. (Amended) [The method of claim 1,] <u>A method for processing a substrate, comprising:</u>

<u>positioning a substrate having a conductive material formed thereon in a polishing apparatus having one or more rotational carrier heads and one or more rotatable platens, wherein the carrier head comprises a retaining ring and a membrane for securing a substrate in the carrier head and the platen has a polishing article disposed thereon;</u>

<u>contacting the substrate surface with the polishing article at a ratio of retaining ring contact pressure to membrane pressure of greater than about 1.1:1; and</u>

<u>polishing the substrate to remove conductive material from the substrate,</u> wherein polishing the substrate comprises polishing the substrate at a first polishing pressure and a first platen rotational speed and then polishing the substrate at a second polishing pressure less than the first polishing pressure and a second platen rotational speed less than the first platen rotational speed.

10. (Amended) The method of claim [10] <u>9</u>, wherein the first polishing pressure is about 3 psi or greater and the second polishing pressure is about 2 psi or less.

15. (Amended) A method for processing a substrate, comprising:

positioning a substrate comprising copper features formed in a low k dielectric layer and a tantalum containing material disposed therebetween, in a polishing apparatus having one or more rotational carrier heads and one or more rotatable platens, wherein the carrier head comprises a retaining ring and a membrane for securing the substrate in the carrier head and the platen has a polishing article disposed thereon;

contacting the substrate surface and the polishing article to each other at a retaining ring contact pressure of about 0.4 psi or greater than a membrane pressure at

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a ratio of retaining ring contact pressure to membrane pressure greater than about 1.1:1 and less than or equal to about 5.5:1;

polishing the substrate at a first relative linear velocity of about 600 mm/second or greater at the center of the substrate; and

polishing the substrate at a second relative linear velocity of less than about 600 mm/second or less at the center of the substrate, wherein [the] <u>a</u> carrier head rotational speed is greater than [the] <u>a</u> platen rotational speed by a ratio of carrier head rotational speed to platen rotational speed of greater than about 1:1.

24. (Amended) The method of claim 21, wherein polishing the substrate comprises polishing the substrate at a ratio of <u>first</u> carrier head rotational speed to <u>first</u> platen rotational speed of between about 10:1 or greater<u>, a ratio of second carrier head rotational speed to second platen rotational speed of between about 10:1 or greater, or both</u>.

27. (Amended) The method of claim 21, wherein the first polishing pressure is about 3 psi or greater and the second polishing pressure is about 2 psi or less.

30. (Amended) The method of claim [29] <u>11</u>, wherein the first relative linear velocity is between about 1000 mm/second and about 1200 mm/second at the center of the substrate and the second relative linear velocity is between about 20 mm/second and about 400 mm/second at the center of the substrate.

31. (Amended) The method of claim [29] <u>11</u>, wherein the conductive material comprises copper, doped copper, copper alloys, or combinations thereof.

32. (Amended) The method of claim [29] <u>11</u>, wherein the second linear velocity is provided by a platen rotational speed between about 10 rpms and about 40 rpms and a carrier head rotational speed between about 20 rpms and about 120 rpms, wherein the carrier head rotational speed is greater than the platen rotational speed by a ratio of carrier head rotational speed to platen rotational speed of between about 2:1 and about 3:1 to remove residual copper material.

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